Mr. Wheelhouse that, at the Leeds Infirmary, in consequence of what we have felt it our duty to write on the subject, ether has had a continuous trial there as an anæsthetic during the last few weeks with favourable results, which confirm all that has been said of its efficiency."

It will be seen that a decided reaction has at last taken place in England in favour of ether as an anæsthetic; it is surprising that so many surgeons should have thus long obstinately persisted in preferring the use of chloroform, notwithstanding the numerous deaths which have followed its use, and the strong array of evidence which has been adduced, in this Journal and elsewhere, of the superior safety of ether.

MEDICAL PATHOLOGY AND THERAPEUTICS, AND PRACTICAL MEDICINE.

20. *Researches on the Embolic Process.*—Prof. JUL. COHNHEIM remarks that the copious literature on the subject of embolism and its consequences, has been chiefly concerned in determining the anatomical condition; the mechanical causation of infarction, etc., has not been explained; and, although Virchow clearly showed that the existence of a collateral circulation was a means of preventing, in many cases, the after-effects of an embolon (infarction), yet the usual explanation, to be found in the German text-books (Rindfleisch, Förster, etc.), is that this same collateral circulation, leading to rupture of the capillaries, is the cause of infarction. The experiments hitherto instituted have been incomplete, in so far as the conditions induced by the introduction of embola into the circulation have not been under observation from beginning to end. At a longer or shorter interval after the introduction of the embolic substance, the organs have been examined; but the intermediate process has not been objectively determined, and the explanations have been necessarily more or less fanciful. Dr. Cohnheim made his observations on the tongue of the frog, where the circulation could be at any time watched through a low power of the microscope. This organ was found to be well suited for the purpose, not only from the arrangement of the bloodvessels in its substance, but also from the peculiar origin of the lingual artery, along with the carotid, from the aorta, whereby it was possible to throw embola into the lingual and its branches, without, at the same time, plugging other parts of the vascular system. The substance used for injection was that adopted by Panum, viz., wax in minute pellets, coloured black, in the form of an emulsion. When an embolon was lodged in an arterial branch, the first and instantaneous effect was, as might be expected, that the blood was driven with increased force through the branch immediately below, the increased rapidity being continued into its capillaries and returning vein. If the obstructed artery had a collateral anastomosis, the pressure thrown upon the branch below it soon became equalised; but if the embolised artery had no anastomosis beyond the plug, the increased rapidity in the lower branch continued for some time, without leading to rupture and hemorrhage, and became gradually less. In the obstructed artery the contents were found at rest for a distance on both sides of the embolum, on the cardiac side, as far as the next branch. It was observed, as peculiar to the frog, that the blood did not coagulate in the vessel; sometimes a closely packed column of red corpuscles occupied it, and at other times it was filled with plasma and white corpuscles alone, the variation being probably dependent on the suddenness with which the stoppage in the circulation was brought about. The condition found in the capillaries of the embolised artery, and in its returning vein, differed entirely according as there was or was not a true anastomosis. If there were, beyond the plug and between it and the capillary territory of the obstructed vessels, another branch pouring in, then the circulation in the capillaries and the vein of the embolised artery remained almost unaffected. This observation corresponded with what Virchow had previously determined. If, however, there were no such anastomosis, then very note-

worthy consequences followed. An artery that has no anastomosis between the seat of the embolon and its capillary territory, may be conveniently styled, says Dr. Cohnheim, a "terminal artery" (*Endarterie*); and in the case of a terminal artery it was uniformly found, whether the artery were large or small, that the blood in its capillaries and returning vein, remained absolutely motionless up to a certain point. At the point where the vein opened into another vein coming from a free artery, and in which the circulation might be either of normal or of increased rapidity, there commenced a backward movement of the stagnating blood in the occluded vein. The free vein transmitted the greater part of its blood in the normal direction towards the heart, but at the point of junction, a portion of it formed a reversed current up into the vein of the embolised artery, whereby the stationary column of blood was driven slowly and gradually back through the vein into the capillaries, and even into the artery itself. When, under this steady pressure, the vascular territory had reached a certain degree of fulness, a rhythmical to-and-fro motion set in, and the observer satisfied himself that the blood-corpuscles were really driven forward by the to-and-fro motion as well as by the steady pressure that preceded it. After a few hours, this region had assumed a dusky red colour, and after one or two days it showed itself to the naked eye as a dark-red sharply defined wedge, beside which the rest of the tongue was markedly pale. When the organ was stretched out and examined under the microscope, the aggregate vessels of the wedge-shaped segment were seen to be densely filled with closely packed red corpuscles, which, in the capillaries, had lost their individual contour. All the other tissues within the segment remained unchanged; the epithelium was normal, the ciliary movements uninterrupted, and only a few of the muscular fibres showed a slight change.

Up to this point, the effect of an embolon has been seen to be a steady filling up (*Anschoppung*) of the vascular territory behind it, and so far the process is intelligible. But after the *Anschoppung* has lasted for some time, a new phenomenon appears, viz., hemorrhage. Along the sides of the capillaries, numerous red corpuscles are seen to mass themselves, obscuring the outline of the vessels, and in some cases completely surrounding them. Where the capillaries lie close together, the red corpuscles agglomerate to form a heap which can be recognized as a hemorrhagic point by the naked eye; at some points of the capillary wall the number of corpuscles is greater than at others. What is usually seen is that, at certain points, large numbers of red corpuscles slip out of the capillary, generally slowly, one after the other, sometimes more quickly, and collect into a mass. At those points, the condition of the capillary wall was in no wise different from that of the wall at other points, and no part of the whole vascular territory showed the slightest morphological change, even under the highest magnifying power, neither in the capillaries nor in the smallest veins, which are also the seat of small extravasations. The final result of this escape of blood (*Blutaustretung*), which may go on for several days, is that the blood within the dark-red wedge previously described is now located not only in the vessels, but also in the tissues, and so there results what we have long known as a "hemorrhagic infarct."

Not satisfied with an explanation of these escapes of blood on mechanical grounds, Dr. Cohnheim instituted a set of experiments with a view to determine whether the stoppage of the circulation within a vessel did not produce an effect upon the physiological soundness (*Integrität*) of its walls. To this end, he entirely stopped the circulation in the frog's tongue by putting a ligature round it bodily at its root. On the stoppage of the circulation, the tongue remained pale or red, according as it was much or little injected with blood at the moment of ligaturing, and the relative colours of the venous and arterial blood remained unchanged. If the ligature remained on for some time, the corpuscles underwent certain changes, but no morphological change was observed in the walls of the vessels. The epithelium, the ciliary movement, and the muscular fibres were all more or less affected according to the duration of the ligature, but no changes were made out in the nerve-fibres nor in the connective-tissue corpuscles. The functional condition of the vessels was then tested by removing the ligature. If the ligature had remained on for only twenty-four hours, the circulation soon regained its normal character, the vessels having first dilated and then contracted to their usual calibre. But on the removal of a forty-eight hours' ligature, the phenomena were entirely different. The circulation recommenced without much difficulty, and the vessels dilated; but only the arteries returned to their normal size, the veins remaining dilated. The circulation in them became slower, the white corpuscles collected along the sides, and in a short time the observer could see a copious emigration of them from all the small and medium-sized veins. In the capillaries, there was a limited "diapedesis" of red corpuscles. If the ligature had remained on for sixty hours or thereabouts, the "diapedesis" or hemorrhage from the capillaries became abundant. If the tongue remained ligatured till the fifth day, the circulation did not re-establish itself at all, and the organ became gangrenous. These results were confirmed by experiments on the lungs and mesentery of the frog, on the rabbit's ear, on the testicle of the dog and guinea-pig, and on the intestine and kidney. Other striking experiments demonstrated that the escape of blood was probably not at all dependent on the nerves, nor on the altered condition of the blood itself; and Dr. Cohnheim concludes that the arrest of the circulation within a vascular territory has such an effect upon the functional soundness of the walls of the vessel, as will account for the escape of blood that was observed in the previous experiments with the embolon. The filled condition (*Anchoppung*) of the vessels behind the embolon passes into a real infarction, by reason of the change which the vessels and, above all, the capillaries undergo in the interval, in consequence of the arrest of their regular blood-current.

In the second half of his monograph, the author applies the results determined by his experiments to explain the occurrence of infarction in the various organs of the human subject, and, in the case of embolic abscess, the causes that determine the specific rather than the mechanical action of an embolon.

Our abstract has necessarily omitted many of the collateral points made out in the research. The entire work may be recommended to English readers, not only for the important facts that it determines, but also for the very complete application of the inductive method that it exemplifies.—*British Med. Journ.*, Nov. 16, 1872, from *Untersuchungen über die Embolischen Processe*, Berlin, 1782.

---

21. *Contagiousness of Phthisis.*—Dr. Richard Payne Cotton, Senior Physician to the Hospital for Consumption, etc., Brompton, whose opinions, from his opportunities for observation, are entitled to great weight, discusses (*Brit. Med. Journal*, Aug. 31st, 1872) the very important practical question whether consumption is or is not contagious, and he strongly maintains its non-contagiousness. He believes phthisis "to be a purely constitutional disease, which may be either inherited or acquired, but which, from its very nature, is incapable of being conveyed from one person to another in the ordinary sense of the word contagion. I have, indeed, never met with a case of pulmonary phthisis, however apparently due to a contagious origin, which could not be much more easily and rationally accounted for by generally recognized causes, than by the doctrine of specific and contagious influences."

"Upon the question of contagion, however," he adds, "practical evidence is of far more value than anything speculative; and as a great experiment upon the zymotic character of phthisis has long been going on at the Consumption Hospital, I shall briefly give the results.

"The Consumption Hospital was opened in the year 1846, with ninety beds. Ten years later, it was completed; and since that time, two hundred beds have been constantly occupied. We have lost, during this long period, only one nurse from phthisis; and this was a poor creature whose husband had deserted her, and who had long endured, from other causes also, considerable mental anxiety and physical exhaustion. On the other hand, the services of the nurses generally have been unusually prolonged; and I can myself testify to their general health being, as a rule, remarkably good. Of those *now resident*, two have been at duty in the hospital seventeen years: one has resided thirteen years; one, eleven years; two, ten years; two, nine years; one, seven years;